

TO: Director, National Institute for Occupational Safety and Health

FROM: California Fatality Assessment and Control Evaluation (CA/FACE) Program

SUBJECT: A Hispanic laborer operating an overhead crane died when he was crushed between two steel frames when the rigging failed

SUMMARY
California FACE Report #06CA001

A 36-year-old Hispanic laborer who was operating an overhead crane in a steel fabrication shop died when he was crushed between two steel frames. The victim was using a chain sling attached to the hook of an overhead crane and configured into a single choker hitch to pick up and turn over the steel frame that was lying horizontally on two saw horses. The hook on the sling did not have a safety latch. The victim was standing between the load and another steel frame that was leaning vertically against the shop platform when the hook disconnected and the vertical frame fell toward the victim, trapping him between the two steel frames. The victim was trained by shop supervisors on the specifics of his job. The riggers in this company were not required to be certified. The CA/FACE investigator determined that, in order to prevent future occurrences, employers, as part of their Injury and Illness Prevention Program (IIPP), should:

- Ensure employees do not place any part of their bodies into areas where they might become trapped when operating an overhead crane.
- Ensure that the tools and equipment used in the shop are periodically inspected for defects and safety compliance, and are repaired or replaced as needed.
- Ensure employees who use cranes to lift loads of varying size and complexity are certified in rigging.

INTRODUCTION

On February 25, 2006, at approximately 8:30 p.m., a 36-year-old Hispanic laborer, working in a steel fabrication shop, died when he was crushed between two fabricated steel frames. The CA/FACE investigator learned of this incident on March 16, 2006, through the Legal Office of the Division of Occupational Safety and Health (Cal/OSHA). Contact with the victim's employer was made on March 30, 2006. On May 18, 2006, the CA/FACE investigator traveled to the facility where the incident occurred and interviewed the company owner and the company's safety manager. The area where the incident took place was examined and photographed.

The employer of the victim was a fabricator and erector of steel products for construction, commercial, and private industry. The company had been in business for 33 years. The facility where the incident took place had approximately 100 employees who worked two shifts. The victim had been working at this company for five years and worked the second shift from 3:00 p.m. to 11:30 p.m. The victim was born in Mexico and it is unknown how long he had been in the United States. He had an ninth grade education and spoke Spanish and some English.

The company where the victim worked had a written IIPP that was updated annually. The program had general procedures that were not task specific for employees to follow. Safety meetings were held monthly in English and Spanish and were documented. The company had a training program that provided training to employees in all the required areas of safety. Training was also provided to all employees with respect to hazards specific to each employee's job assignment. The training program consisted of classroom instruction and on-the-job training. Most of the training was done by shop supervisors. The company also had a train-the-trainer program that was given by shop supervisors. Training was measured by supervisor observation of job performance.

The victim was specifically trained to do the loading and unloading of the steel products on the trucks. This training, given by the shop supervisors, included the use of the overhead crane, proper use of slings and rigging, and the proper stacking techniques for steel. The victim and another employee were the only two non-supervisory employees at the company with this specific training. The company did not require their riggers to be certified. The victim had been rigging for three years.

INVESTIGATION

The site of the incident was a steel fabrication shop. On the day of the incident, the victim was assigned to paint two rectangular fabricated steel frames that measured approximately 30' x 4' and weighed approximately 4,000 pounds each. One steel frame was lying horizontally on wooden beams supported by saw horses on each end. The steel frame overhung the wooden beams by more than 10 feet on each side. The other steel frame was standing adjacent to the saw horses. After the victim finished painting one side of the horizontal steel frame, he activated the overhead crane with a pendulum control. He attached a chain sling to the hook on the bottom pulley of the crane (Exhibit 3) and then passed the chain through the steel frame that was lying on the wooden beams. The chain sling was placed midway down the length of one of the main steel frame members. He then took the hook attached to the chain sling and fastened it over the chain sling, creating a single choker hitch (Exhibit 4). The hook did not have a safety latch to prevent the chain sling from slipping out of the throat of the hook.

The victim then applied tension to the chain sling by raising the hook of the overhead crane using the pendulum control. The victim raised the piece off the wooden beams to reposition it so that when it was lowered all the way the unpainted side would be face-up. He then lowered the steel frame onto the wood beams on top of the saw horses.

This released the tension on the chain because the steel frame remained on edge instead of lowering onto its side. Without any tension on the chain sling and no safety latch on the chain sling hook, the single choker hitch came undone. The wood beams, not strong enough to hold the full weight of the vertical steel frame, broke and the steel frame dropped to the ground. It fell forward toward the victim, crushing him between the two vertical pieces of steel. No one witnessed the incident. Two employees working in the same area heard the crash when the steel frame fell and called for help. They re-attached the chain sling to the steel frame and lifted it off the victim. Other employees dragged him from underneath the steel frame. The paramedics arrived at the incident scene and pronounced the victim dead.

CAUSE OF DEATH

The cause of death, according to the death certificate, was blunt injuries.

RECOMMENDATIONS / DISCUSSION

Recommendation #1: Ensure employees do not place any part of their bodies into areas where they might become trapped when operating an overhead crane.

Discussion: In order to protect themselves and other employees, operators of overhead cranes must be constantly aware of their surroundings, and move their load in a controlled manner. In this particular case, the victim stood in an area where there was no exit should something go wrong. The victim should have avoided the areas directly under and close to the load. Employers can enhance worker compliance with safe work practices through programs of task-specific training, supervision, recognition, and progressive disciplinary measures.

Recommendation #2: Ensure that the tools and equipment used in the shop are periodically inspected for defects and safety compliance, and are repaired or replaced as needed.

Discussion: The chain sling that the victim was using to move the steel frame was the standard sling he had used on numerous occasions. The safety latch attached to the hook had broken off at some point before the day of the incident, and had not been replaced. The latch was designed to prevent the hook from disengaging from the chain when properly rigged to lift material. Without the safety latch, there was nothing to prevent the hook from becoming disengaged from the chain when the tension was released from the sling. A thorough inspection of alloy steel chain slings performed by a qualified person designated by the employer should have discovered the missing safety latch as well as excessive wear, defective welds, deformation, and increase in link length.

Recommendation 3: Employers should consider requiring that all workers who independently rig loads of varying size, shape, and/or weight be certified riggers. Alternatively, they should consider implementing a training/testing program to

ensure that workers rigging such loads attain a rigging skill level equivalent to certification.

Discussion: In some workplaces, cranes are used to lift loads that never change in shape, size, or weight. In these types of work situations, a standard operating procedure can be developed that completely describes the actions and rigging that must be performed to safely accomplish any lift. Since the type of rigging and the actions surrounding the lift do not change from lift to lift, any worker performing the lift does not need specialized rigging knowledge. They can be trained to safely perform the lift through training in the standard operating procedure. In other workplaces, like the one in this incident, there is no standard load. Since the pieces being constructed are custom-made for each job, this implies that each lift will be different from the next. Properly rigging loads that vary in size, shape, and/or weight requires the specialized knowledge of workers who are certified riggers. If a workplace does not have workers who are certified in rigging, they can ensure that best practices are followed by implementing a training/testing program to assist their workers attain a rigging skill level equivalent to certification.

References:

California Code of Regulations, Vol. 9, Title 8, Sections 5002, Overhead Loads, 5009, Floor-Operated Cranes, 5042, Slings, Safe Operating Practices. 5043, Slings, Inspections, 5044, Alloy Steel Chain Slings.

Rigging Manual, Construction Safety Association of Ontario, 1985

EXHIBITS:



Exhibit 1. A picture of the work area where the incident took place.



Exhibit 2. A picture of the steel frames that were involved in the incident.



Exhibit 3. A picture of the chain sling that was used to lift the steel frame from a horizontal position to a vertical position.



Exhibit 4. A picture of a chain sling in a choker hitch position that was used to pick up the steel frame.

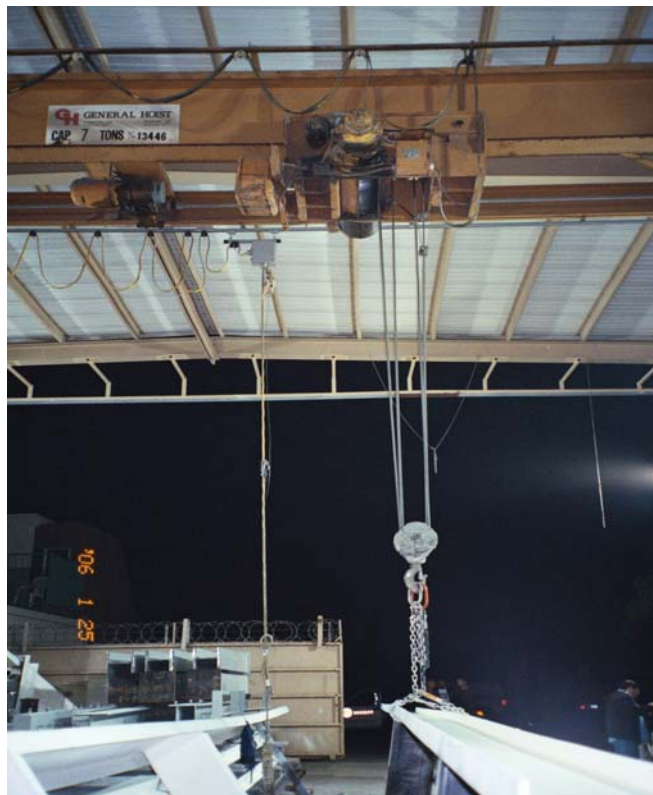


Exhibit 5. A picture of the overhead crane and controls involved the incident.

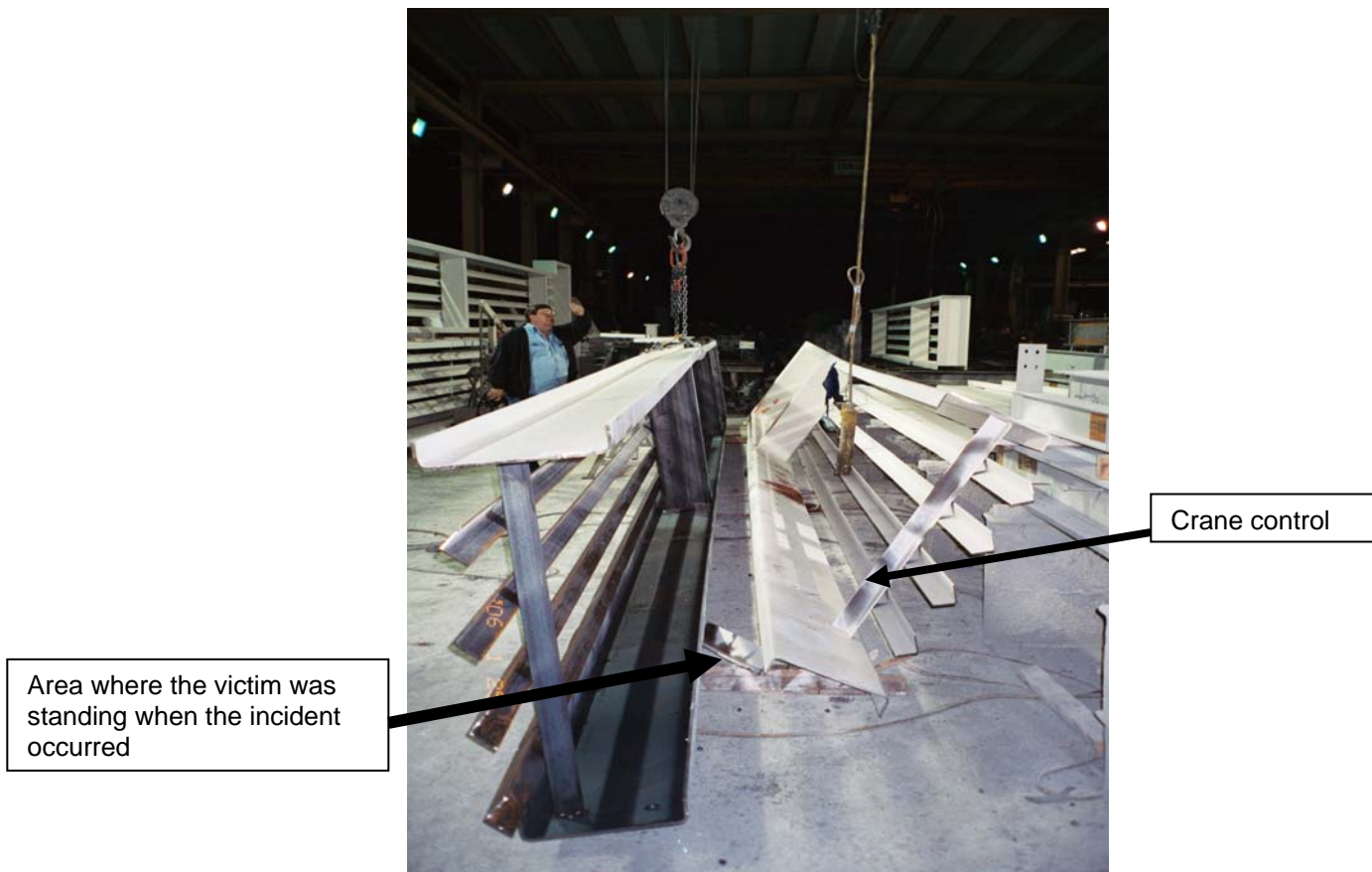


Exhibit 6. A picture showing the area where the victim was standing and the crane control that the victim used to lift the steel frame.



Exhibit 7. A picture of a piece of the wooden beam that broke under the weight of the steel frame.

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FATALITY ASSESSMENT AND CONTROL EVALUATION PROGRAM

The California Department of Health Services, in cooperation with the Public Health Institute and the National Institute for Occupational Safety and Health (NIOSH), conducts investigations of work-related fatalities. The goal of this program, known as the California Fatality Assessment and Control Evaluation (CA/FACE), is to prevent fatal work injuries in the future. CA/FACE aims to achieve this goal by studying the work environment, the worker, the task the worker was performing, the tools the worker was using, the energy exchange resulting in fatal injury, and the role of management in controlling how these factors interact. NIOSH-funded, State-based FACE programs include: California, Iowa, Kentucky, Massachusetts, Michigan, New Jersey, New York, Oregon, and Washington.

Additional information regarding the CA/FACE program is available from:

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